

REMARKS

Claims 1-10 are all the claims pending in the application. Claims 1-10 presently stand rejected.

Drawings

The drawings filed on January 24, 2002 have been accepted by the Examiner; however, the Submission of Drawings was actually filed on June 20, 2002. Applicants request clarification from the Examiner regarding this matter.

Title

The title of the invention --POLARIZING MEMBER AND LIQUID-CRYSTAL DISPLAY DEVICE-- is objected to by the Examiner because it is not descriptive. Applicants amend the title to overcome this objection.

Claims

Claims 1-10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kishimoto (JP 09-329779) in view of Itoh et al. (EP 0457607).

Analysis

Claim 1 is the only claim in independent form; therefore, the following discussion is initially directed to this independent claim.

Claim 1 is directed to a polarizing member that includes a cholesteric liquid-crystal layer, a quarter-wave plate, and an optical rotatory layer.

The optical rotatory layer is provided for rotating the plane of polarization of linearly polarized light made to exit from the quarter-wave plate.

Applicants respectfully submit that one would not have been motivated to combine the references to arrive at the claimed invention for the following reasons.

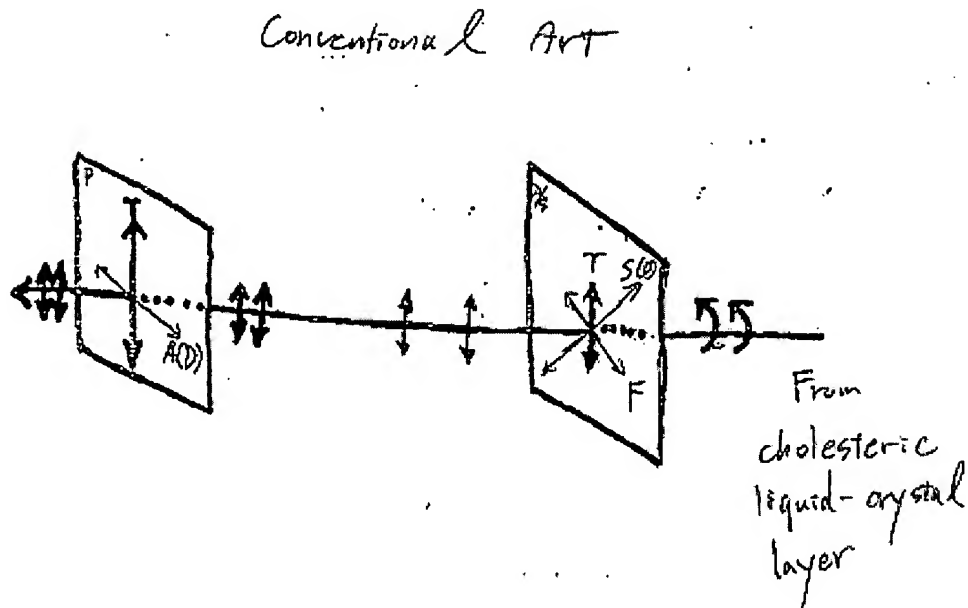
Please refer to the drawings below to understand the following comments. In the drawings, each symbol means as follows.

P: Polarizer; R: Optical rotary layer; $\lambda/4$: quarter-wave plate;

T: Transmission axis; A: Absorption axis; F: Fast axis; S: Slow axis;

D: Drawing direction of the raw film (Drawing axis)

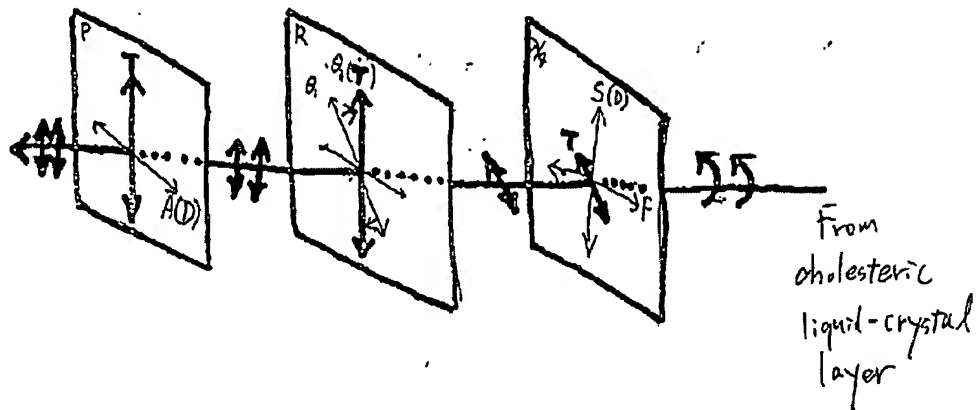
Kishimoto discloses a "CRT (Cholesteric Reflective Polarizer)" which is formed of a combination of a cholesteric liquid crystal film (cholesteric liquid crystal-layer) and a quarter-wave plate. When the CRT is assembled into the LCD device, it is combined with an absorption type polarizer as discussed in Kishimoto. At this time, the CRT and the polarizer are laminated in a state where the transmission axis of the CRT (quarter-wave plate) and the transmission axis of the polarizer are aligned to secure the transmission of light. Therefore, the drawing axis (e.g., slow axis) of the quarter-wave plate in the CRT and the drawing axis (e.g., absorption axis) of the polarizer are displaced by 45 degrees. See the drawing below labeled "Conventional art".



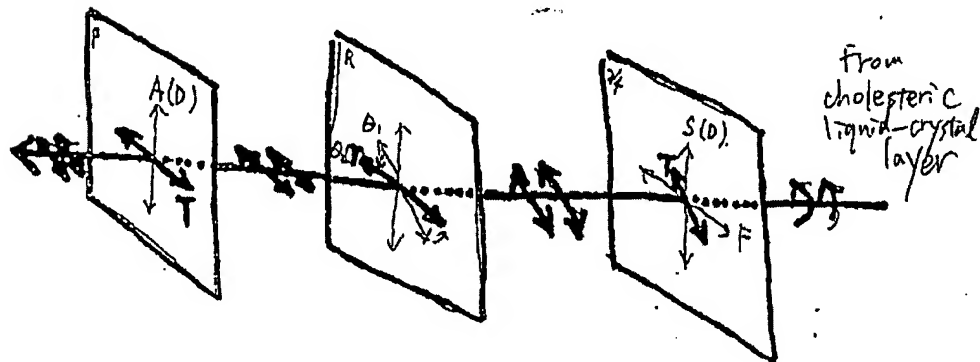
Accordingly, four axes, transmission axis, absorption axis, slow axis and fast axis are apparently formed on the laminate of the polarizer and the quarter-wave plate. Consequently, when viewed from the oblique direction, coloring problem occurs in the four directions of the polarizer absorption axis (drawing axis), polarizer transmission axis, quarter-wave plate slow axis (drawings axis), and quarter-wave plate fast axis. In other words, the coloring of the display is observed differently when viewed from the four directions

On the other hand, according to the present invention, an optical rotary layer is further added to the combination of a cholesteric liquid-crystal layer and a quarter-wave plate. The transmission axis of the quarter-wave plate is rotated by 45 degrees, 90 degrees, ...by the optical rotary layer. Consequently, the optical axis of the quarter-wave plate and the optical axis of the

Present invention 1



Present invention 2



polarizer to be combined are aligned to improve luminance and the various coloring characteristics when viewed from the oblique direction. In the drawings, "Present invention 1" shows a case where the axes of the quarter-wave plate are rotated by 45 degrees in the clockwise direction by means of the optical rotary layer. "Present invention 2" shows a case where the axes of the quarter-wave plate are rotated by 45 degrees in the counterclockwise direction by means of the optical rotary layer.

Although Kishimoto discloses a combination of a cholesteric liquid crystal film and a quarter-wave plate, there is no suggestion to combine the CRT with the optical rotary layer to improve the coloring characteristics and luminance. Ito merely discloses an optical rotary layer and does not teach or suggest the combination with either the cholesteric liquid-crystal layer or a quarter-wave plate.

Thus, the Examiner's rejection as being unpatentable over Kishimoto in view of Ito et al. is improper since such a combination is based on hindsight. Kishimoto never teaches or discloses a problem of coloring viewed from the oblique direction, and thus, one would not have been motivated to incorporate the optical rotary layer of Ito therein.

Thus, claim 1 should be patentable.

The remaining rejections are directed to the dependent claims. These claims are patentable for at least the same reasons as claim 1, by virtue of their dependency therefrom.

In addition, Applicants add dependent claim 11 to clarify the particular placement of the elements in claim 1. Specifically, the quarter-wave plate is interposed between the cholesteric liquid-crystal layer and the optical rotatory layer. The combination of cited references fails to teach or suggest this particular arrangement for the layers, thus claim 11 is patentable.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 10/031,871

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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PATENT TRADEMARK OFFICE

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